REMARKS

Claims 1-24 were examined, with claims 1, 21 and 24 being independent. By the present amendment, new claim 25 was added. No new matter has been added. Thus, after entry of this Amendment, claims 1-25 will be pending in the application.

Allowable Subject Matter

Applicant gratefully acknowledges the Patent Office's indication that claims 4 and 17-18 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Rejections under 35 U.S.C. §103(a)

Claims 1-3, 5-16, 19-20 and 23 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,093,053 to Eckardt et al.

The Patent Office has taken the position that metering of an injectable component is well known and such would have been obvious to one of ordinary skill in the art practicing the process of Eckardt in order to produce a core layer of desired density. The Patent Office submits that the pressure exerted on the propellant during the injection phase of the process of Eckardt is inherently greater than the pressure on the propellant after its addition in order to permit expansion to occur in the cavity.

Applicant respectfully traverses the rejection.

Eckardt is directed to a multiple-layer molded article with an outer skin of compact thermoplastic material and a core of foamed thermoplastic material wherein in a first step a compact thermoplastic material without an expanding agent is injected into a mold, followed by a second step in which a foamable plastic material containing an expanding agent is injected into the mold, and in a third step an additional gas and/or low boiling liquid is injected into the mold.

By injection of the additional gas in the third step a hollow space is formed in the foamable plastic material. Due to the pressure exerted by the gas, premature expansion of the expanding agent is prevented and only when the gas pressure of the additional gas has been lowered after a few seconds foaming occurs resulting in an evenly foamed product (column 3, lines 19 to 45).

According to Eckardt, chemical as well as physical expanding agents can be used (column 4, lines 1 to 17). However, Eckardt is silent about any further details how to add the expansion agent to the plastic material, in particular, to any measures necessary for adding a physical expanding agent.

The Patent Office is correct insofar as it is routine work for a skilled person to add any additives to a melt. However, there are several ways for adding such additives to a melt. In the method of claim 1, metering of the physical propellant in the second stage occurs in a pressure regulated manner, wherein the pressure which is exerted on the propellant during the propellant injection phase is greater than the pressure which is exerted on the propellant in the phases between or before or after metered addition, and the expansion of the propellant occurs in the cavity. Thus, the physical expanding agent is added to the melt in a very specific way, namely by regulating the pressure i.e. the pressure exerted on the expanding agent is increased during injection to the melt. That is, the pressure during the injection phase is higher than the pressure which is exerted on the expanding agent in the phases between or before or after addition. Eackard fails to provide any motivation for one of skill in the art to add a physical expanding agent as claimed. That is, it is not only metering which is done by the present method, but the metering is done in a very specific way, which is not obvious to one of ordinary skill in the art in view of Eckardt.

Claim 2 of the present invention recites that the propellant is a compressible fluid. In contrast, Eckardt is silent on the nature of any physical expanding agent. However, a low-bowling liquid can be added in step 3 to the mold, as noted in Eckardt where it states that : . . ". a pressurized, low-bowling liquid may be introduced into the mold cavity either together with the additional gas

or instead of the additional gas." (Eckardt at Col. 3, Lines 6-9). Consequently, Eckardt gives a skilled person no idea as to the handling of a physical expanding agent, in particular to the specific handling as disclosed in the present invention.

Claim 3 of the present invention recites a further step of maintaining the propellant under pressure an intermediate cycle time before and after the propellant injection phase. There is no disclosure in Eckardt to maintain the expanding agent under pressure in an intermediate cycle time before and after the injection phase of the expanding agent. As set out above, Eckardt is completely silent as to how to carry out the addition of the expanding agent. Therefore, Eckardt fails to teach or suggest the subject matter of claim 3.

Independent claim 1 is therefore patentable over Eckardt, and the claims that depend therefrom directly or indirectly are patentable for at least the same reasons. Withdrawal of the rejection is respectfully requested.

B Claims 21-22 and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,344,710 to Johnson as set forth in the previous Office Action.

The Patent Office maintained the rejection set forth in the previous Office Action.

Applicant respectfully traverses the rejection.

The Patent Office argues that it is obvious for a skilled person that the structure of Johnson is capable of being used in a discontinuous manner by connecting it to a mold. However, it is clear from Figure 1 that the expanding agent is mixed with the plastic material in the mixing zone 36. Consequently, if in a subsequent step plastic material without expanding agent should be supplied to a mold via the extruder, this plastic material has to pass the mixing zone 36 with the residual plastic material mixed with expanding agent remaining from the preceding step, which results in uncontrollable contamination of the subsequent plastic material with expanding agent. Thus, the

structure of Johnson is clearly not suitable for a discontinuous process as disclosed in the present invention.

Moreover, Johnson does not disclose a controlled closure mechanism which opens upon increase of the pressure above the holding pressure of the control closure mechanism.

In contrast, the controlled closure mechanism is an essential feature of the device of the present invention. If the pressure exerted on the expanding agent is below the holding pressure of the controlled closure mechanism, the controlled closure mechanism is closed. If the pressure exerted on the expanding agent is above the holding pressure of the mechanism, the controlled closure mechanism is open. This means that the controlled closure mechanism is either closed or open, but there is no intermediate state such as only half-open.

There is a substantial difference between the controlled closure mechanism of the present invention and the flow control system as disclosed by Johnson.

As noted previously, Johnson is directed to an extrusion process which is continuous. Consequently, the flow control system is configured for the continuous injection of expanding agent.

The mode of adding expanding agent, i.e., controlling the addition of expanding agent, according to Johnson is explained in column 2, line 67 to column 3, line 28 with reference to figure 2. According to this explanation, the liquid flow rate of the expanding agent is measured by a flow measurement means comprising an orifice plate 112 and differential pressure transducer 114, which generates a signal representative of the liquid flow rate. This signal is transmitted to the flow controller 116. The flow controller 116 compares the measured actual flow rate with a set flow rate. Depending on any deviation between the actual flow rate and the set flow rate, the control valve 118 is operated. That is, the state of opening of the control valve is changed depending on the degree of deviation of the flow rate. For example, if the actual flow rate is slightly less than the set flow rate, the control valve will be opened slightly more. To the contrary, when the actual flow rate is slightly more than the set flow rate, the opening state of the control valve will be slightly reduced.

Depending on the deviation of the actual flow rate from the set flow rate, the opening state of the control rate will be more or less reduced or increased.

The operation of the control valve does not depend on any holding pressure of the control valve as does the control closure mechanism of the present invention. The opening state of the control valve 118 can be any state between completely open and completely closed, whereas the control closure mechanism of the present invention is either open or closed. There is no intermediate opening state, that is if the holding pressure of the control closure mechanism is exceeded, the mechanism is open, and if the holding pressure is below the holding pressure, the mechanism is closed.

Contrary to the controlled closure mechanism of the present invention, according to Johnson the opening operation or opening state is not dependent on a specific holding pressure of the control valve 118. That is, the set flow rate must not be confused with the holding pressure.

Consequently, the operation mode of the controlled closure mechanism of present claim 21 is completely different from that of the flow control system of Johnson, in particular, of the control valve 118.

As set out above, the device according to Johnson is configured for continuous extrusion whereas the device according to the present invention is particularly configured for carrying out the discontinuous process of the preceding claims.

Independent claims 21 and 24 are therefore patentable over Eckardt, and the claims that depend therefrom directly or indirectly are patentable for at least the same reasons. Withdrawal of the rejection is respectfully requested.

New Claims

New claim 25 was added to further define Applicant's contribution to the art, and not for purposes of patentability with respect to the cited prior art references. New claim 25 includes all of the limitations found in existing claim 21 and 1, and should not require any additional searching on the part of the Patent Office. New claim 25 is believed patentable for at least the same reasons set forth above.

CONCLUSION

In view of the foregoing amendments and remarks, the Applicant respectfully submits that all of the claims pending in the above-identified application are in condition for allowance, and a notice to that effect is earnestly solicited.

If the present application is found by the Examiner not to be in condition for allowance, then the Applicant hereby requests a telephone or personal interview to facilitate the resolution of any remaining matters. Applicant's attorney may be contacted by telephone at the number indicated below to schedule such an interview.

The U.S. Patent and Trademark Office is authorized to charge any additional fees incurred as a result of the filing hereof or credit any overpayment to our deposit account #19-0120.

Respectfully submitted,
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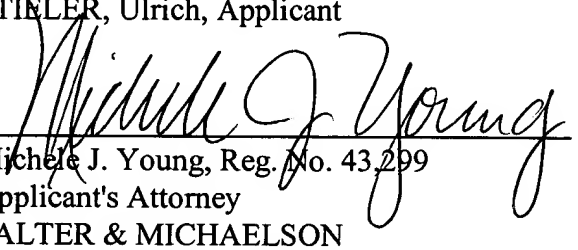
By: 

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